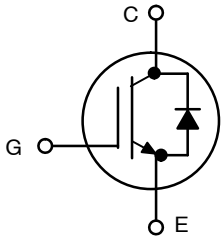
IGBT – FS2 Solar/UPS, 650 V, 75 A

NGTB75N65FL2WG

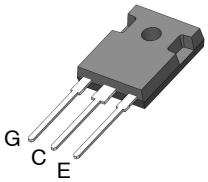
75 A, 650 V
V_{CEsat} = 1.70 V
E_{off} = 1.0 mJ

This Insulated Gate Bipolar Transistor (IGBT) features a robust and cost effective Field Stop (FS) Trench construction, and provides superior performance in demanding switching applications, offering both low on state voltage and minimal switching loss.



Features

- Extremely Efficient Trench with Field Stop Technology
- T_{Jmax} = 175 °C
- Soft Fast Reverse Recovery Diode
- Optimized for High Speed Switching
- 5 µs Short-Circuit Capability
- These are Pb-Free Devices

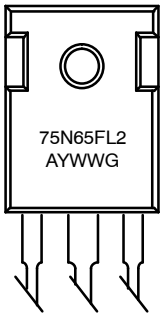


TO-247
CASE 340AM

Typical Applications

- Solar Inverters
- Uninterruptible Power Supplies (UPS)
- Welding

MARKING DIAGRAM



75N65FL2 = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

ABSOLUTE MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V_{CES}	Collector-emitter Voltage	650	V
I_C	Collector Current @ T_C = 25 °C @ T_C = 100 °C	 100 75	A
I_F	Diode Forward Current @ T_C = 25 °C @ T_C = 100 °C	 100 75	A
I_{FM}	Diode Pulsed Current T_{PULSE} Limited by T_J Max	200	A
I_{CM}	Pulsed Collector Current, T_{pulse} Limited by T_{Jmax}	200	A
t_{SC}	Short-circuit Withstand Time V_{GE} = 15 V, V_{CE} = 400 V, $T_J \le$ +150 °C	5	µs
V_{GE}	Gate-emitter Voltage	±20	V
	Transient Gate-emitter Voltage (T_{PULSE} = 5 µs, D < 0.10)	±30	V
P_D	Power Dissipation @ T_C = 25 °C @ T_C = 100 °C	 595 265	W
T_J	Operating Junction Temperature Range	−55 to +175	°C
T_{stg}	Storage Temperature Range	−55 to +175	°C
T_{SLD}	Lead temperature for soldering, 1/8″ from case for 5 seconds	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ORDERING INFORMATION

Device	Package	Shipping
NGTB75N65FL2WG	TO-247 (Pb-Free)	30 Units / Rail

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THERMAL CHARACTERISTICS

Symbol	Rating	Value	Unit
$R_{\theta JC}$	Thermal resistance junction-to-case, for IGBT	0.28	°C/W
$R_{\theta JC}$	Thermal resistance junction-to-case, for Diode	0.62	°C/W
$R_{\theta JA}$	Thermal resistance junction-to-ambient	40	°C/W

ELECTRICAL CHARACTERISTICS (T_J = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
STATIC CHARACTERISTIC						
$V_{(BR)CES}$	Collector-emitter breakdown voltage, gate-emitter short-circuited	V_{GE} = 0 V, I_C = 500 μA	650			V
V_{CEsat}	Collector-emitter saturation voltage	V_{GE} = 15 V, I_C = 75 A V_{GE} = 15 V, I_C = 75 A, T_J = 175 °C	1.50	1.75 2.30	2.00	V
$V_{GE(th)}$	Gate-emitter threshold voltage	V_{GE} = V_{CE}, I_C = 350 μA	4.5	5.5	6.5	V
I_{CES}	Collector-emitter cut-off current, gate-emitter short-circuited	V_{GE} = 0 V, V_{CE} = 650 V V_{GE} = 0 V, V_{CE} = 650 V, T_J = 175 °C		4.0	0.1	mA
I_{GES}	Gate leakage current, collector-emitter short-circuited	V_{GE} = 20 V , V_{CE} = 0 V			200	nA
DYNAMIC CHARACTERISTIC						
C_{ies}	Input capacitance	V_{CE} = 20 V, V_{GE} = 0 V, f = 1 MHz		7500		pF
C_{oes}	Output capacitance			300		
C_{res}	Reverse transfer capacitance			190		
Q_g	Gate charge total	V_{CE} = 480 V, I_C = 50 A, V_{GE} = 15 V		310		nC
Q_{ge}	Gate to emitter charge			60		
Q_{gc}	Gate to collector charge			150		
SWITCHING CHARACTERISTIC, INDUCTIVE LOAD						
$t_{d(on)}$	Turn-on delay time	T_J = 25 °C V_{CC} = 400 V, I_C = 75 A R_g = 10 Ω V_{GE} = 0 V/ 15 V		110		ns
t_r	Rise time			48		
$t_{d(off)}$	Turn-off delay time			270		
t_f	Fall time			70		
E_{on}	Turn-on switching loss			2.2		mJ
E_{off}	Turn-off switching loss			1.1		
E_{ts}	Total switching loss			3.3		
$t_{d(on)}$	Turn-on delay time	T_J = 150 °C V_{CC} = 400 V, I_C = 75 A R_g = 10 Ω V_{GE} = 0 V/ 15 V		100		ns
t_r	Rise time			50		
$t_{d(off)}$	Turn-off delay time			280		
t_f	Fall time			100		
E_{on}	Turn-on switching loss			2.8		mJ
E_{off}	Turn-off switching loss			1.6		
E_{ts}	Total switching loss			4.4		
DIODE CHARACTERISTIC						
V_F	Forward voltage	V_{GE} = 0 V, I_F = 75 A V_{GE} = 0 V, I_F = 75 A, T_J = 175 °C	1.50	2.20 2.40	2.90	V
t_{rr}	Reverse recovery time	T_J = 25 °C I_F = 75 A, V_R = 400 V di_F/dt = 200 A/μs		80		ns
Q_{rr}	Reverse recovery charge			0.40		μC
I_{rrm}	Reverse recovery current			8		A
t_{rr}	Reverse recovery time	T_J = 175 °C I_F = 75 A, V_R = 400 V di_F/dt = 200 A/μs		143		ns
Q_{rr}	Reverse recovery charge			1.45		μC
I_{rrm}	Reverse recovery current			16		A

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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TYPICAL CHARACTERISTICS

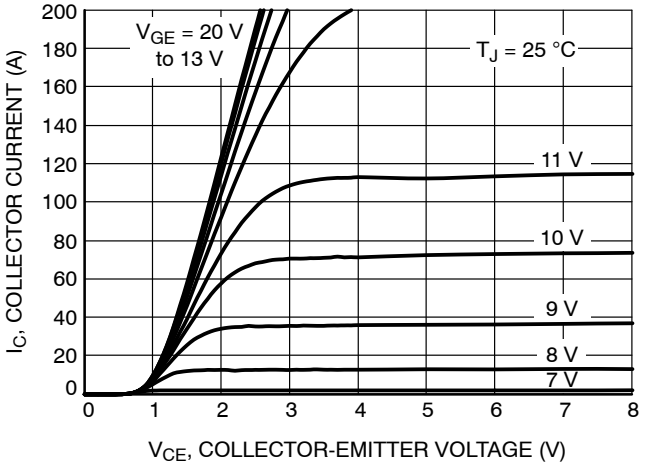


Figure 1. Output Characteristics

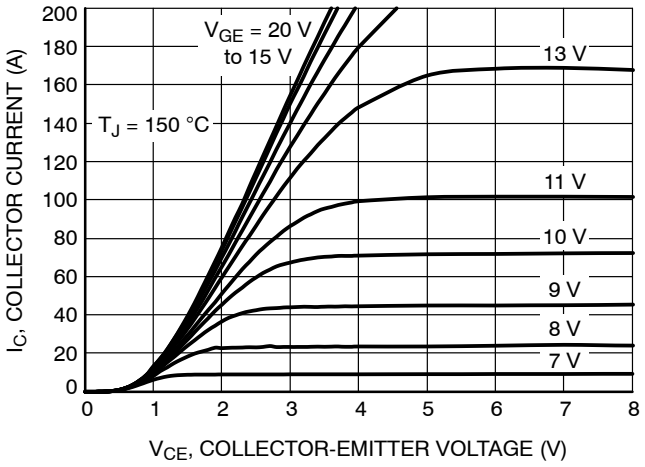


Figure 2. Output Characteristics

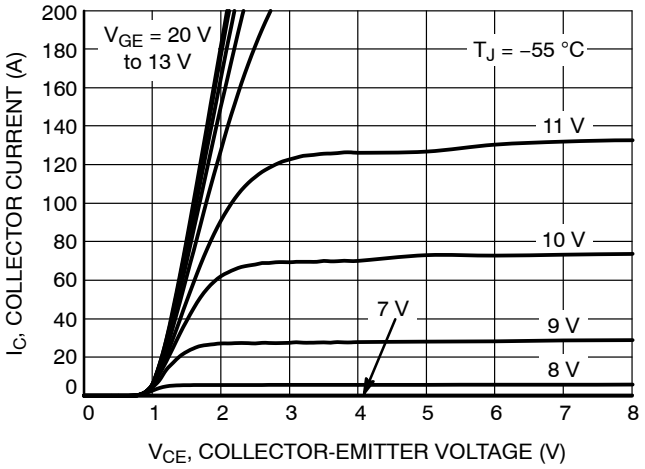


Figure 3. Output Characteristics

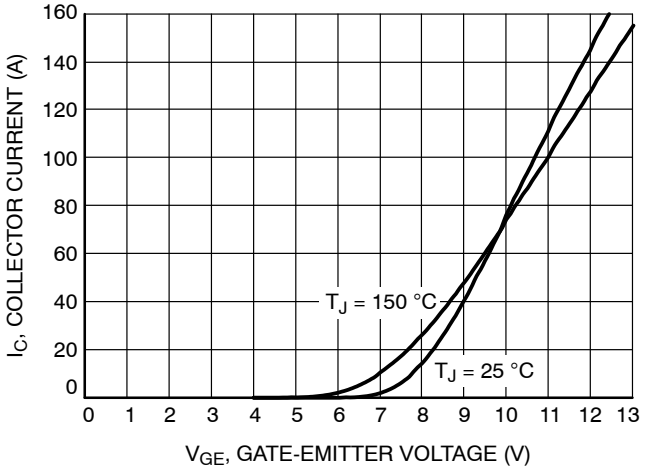


Figure 4. Typical Transfer Characteristics

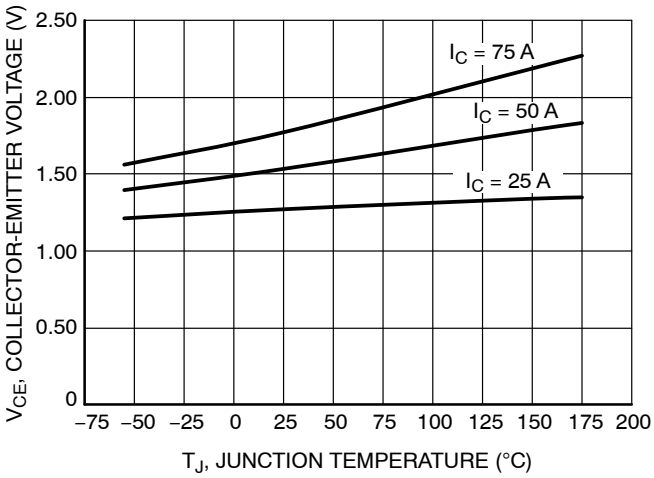


Figure 5. $V_{CE(sat)}$ vs. T_J

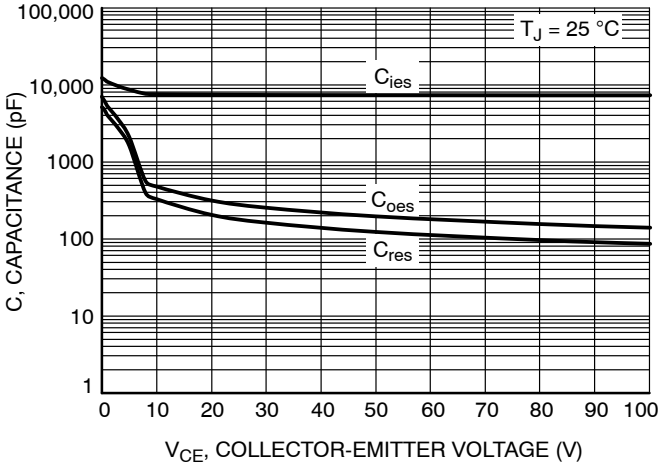


Figure 6. Typical Capacitance

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TYPICAL CHARACTERISTICS (continued)

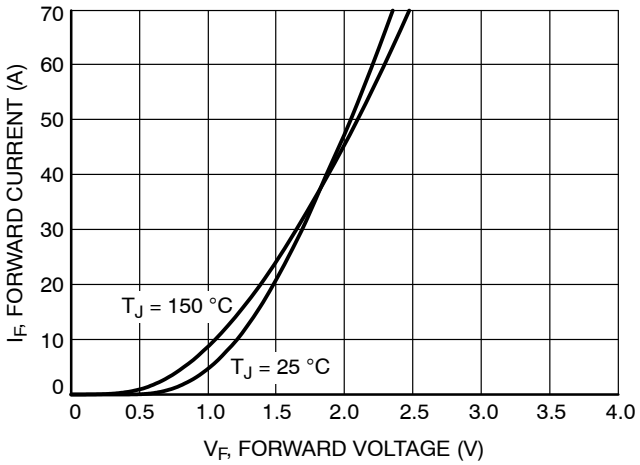


Figure 7. Diode Forward Characteristics

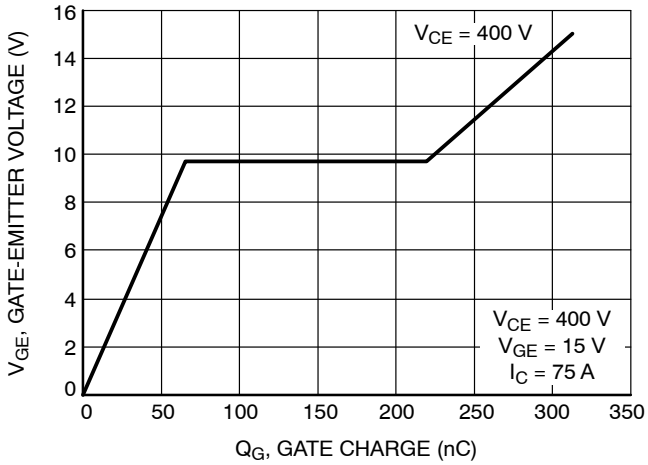


Figure 8. Typical Gate Charge

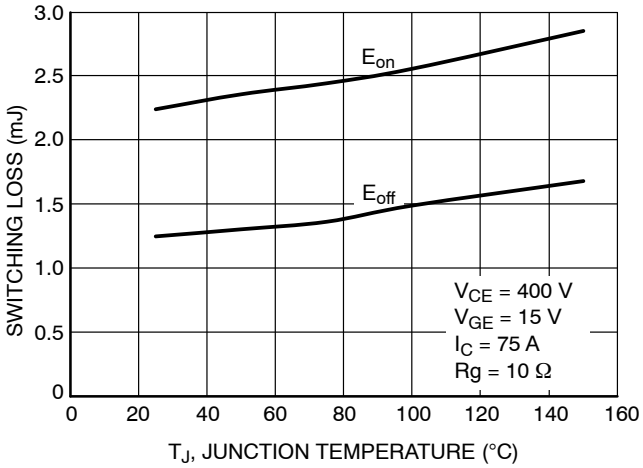


Figure 9. Switching Loss vs. Temperature

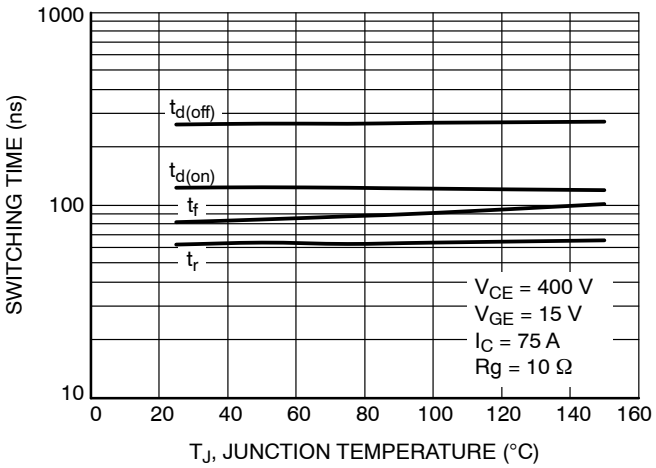


Figure 10. Switching Time vs. Temperature

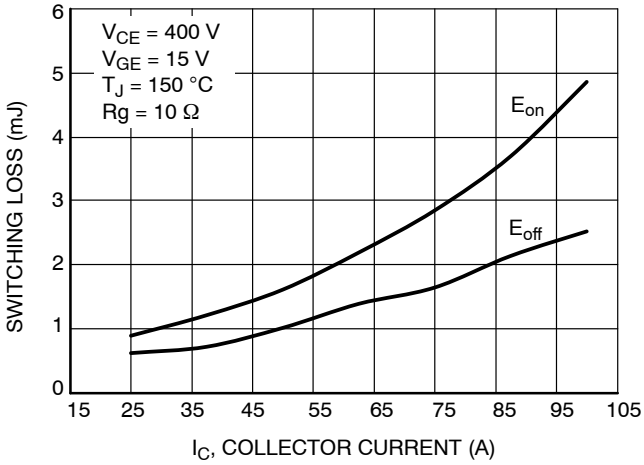


Figure 11. Switching Loss vs. I_C

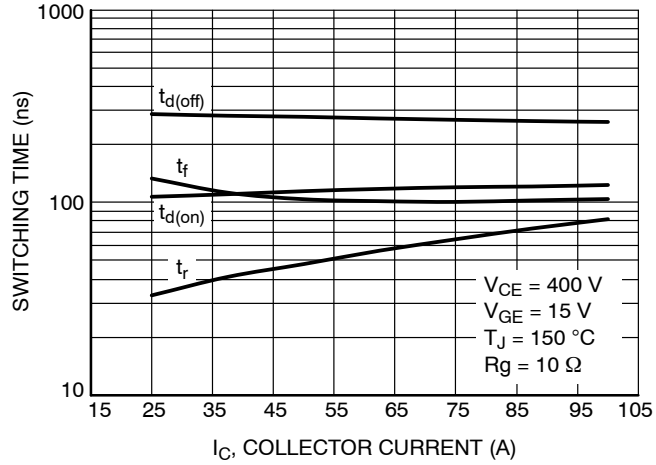


Figure 12. Switching Time vs. I_C

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TYPICAL CHARACTERISTICS (continued)

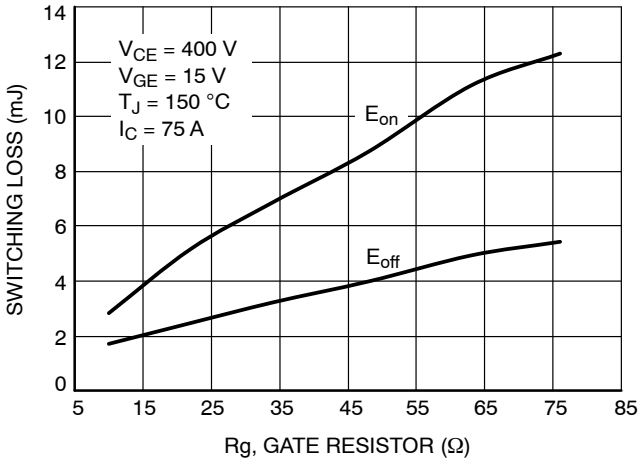


Figure 13. Switching Loss vs. Rg

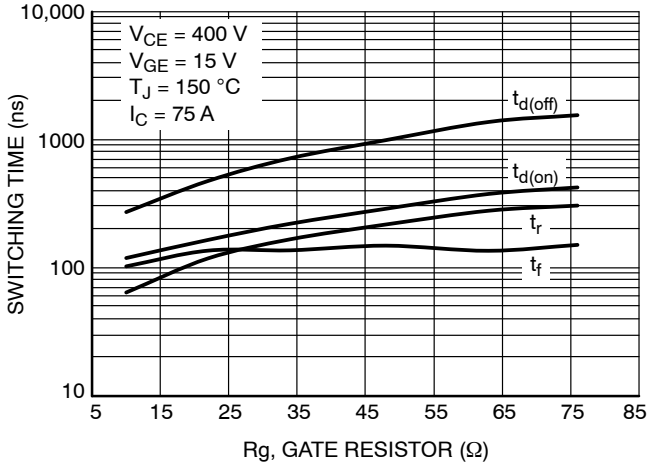


Figure 14. Switching Time vs. Rg

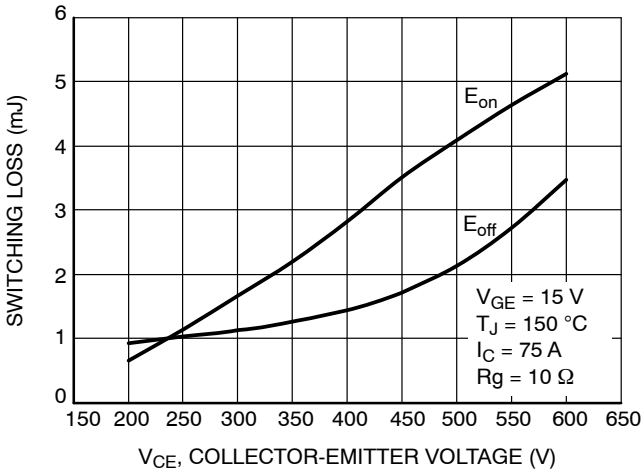


Figure 15. Switching Loss vs. V_{CE}

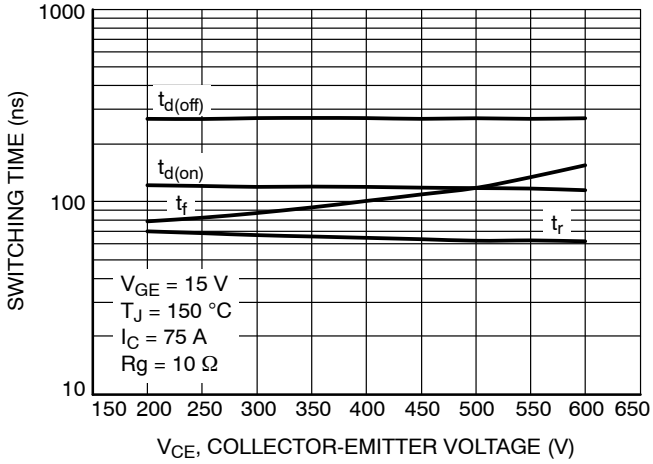


Figure 16. Switching Time vs. V_{CE}

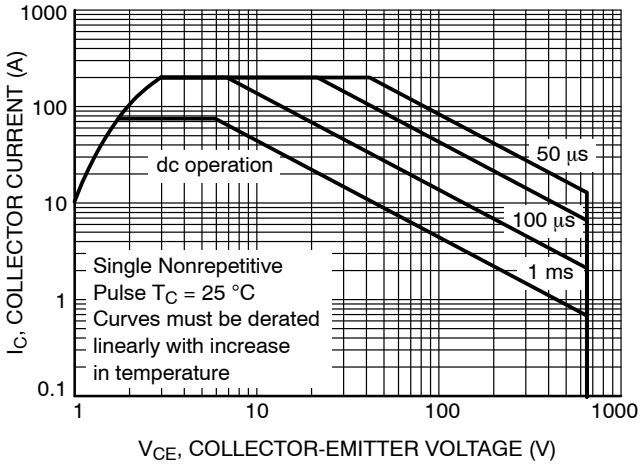


Figure 17. Safe Operating Area

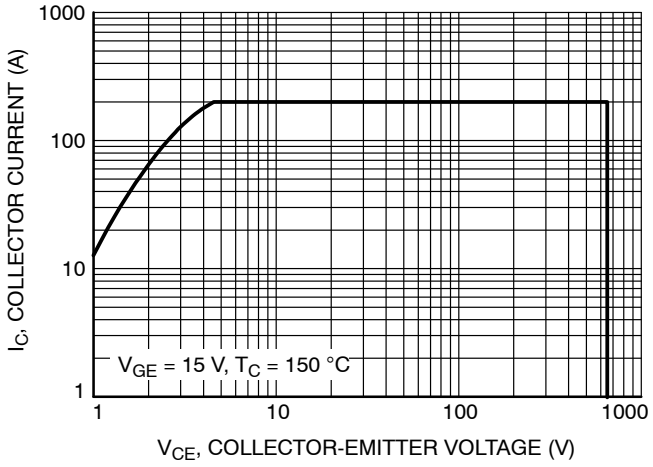


Figure 18. Reverse Bias Safe Operating Area

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TYPICAL CHARACTERISTICS (continued)

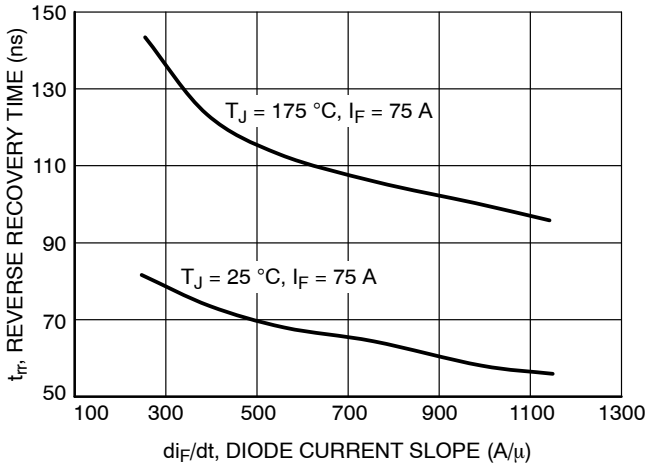


Figure 19. t_{rr} vs. di_F/dt (V_R = 400 V)

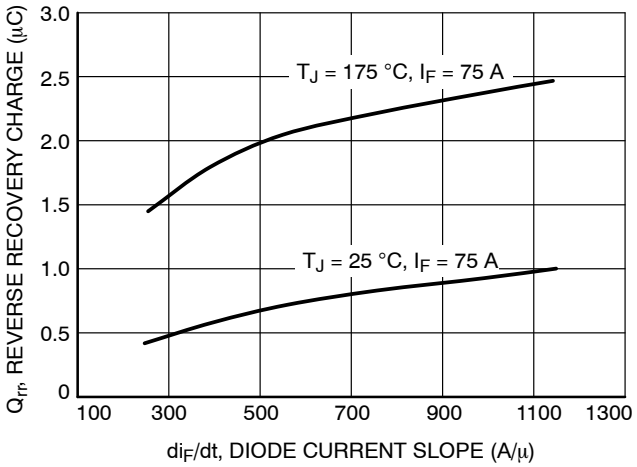


Figure 20. Q_{rr} vs. di_F/dt (V_R = 400 V)

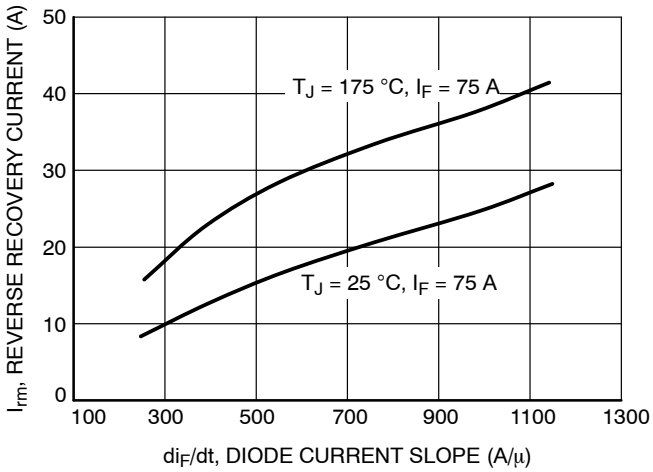


Figure 21. I_{rm} vs. di_F/dt (V_R = 400 V)

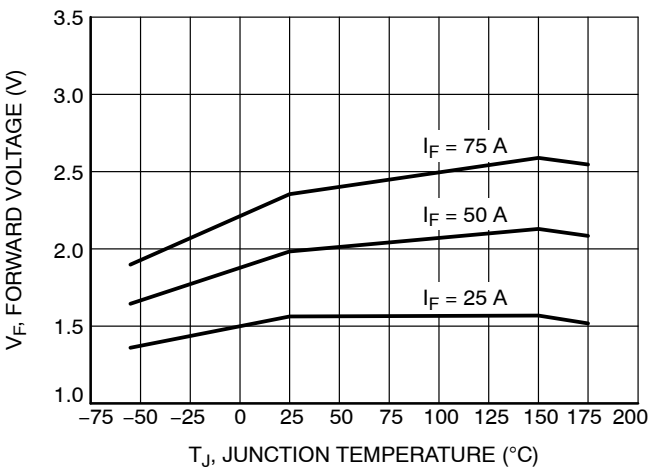
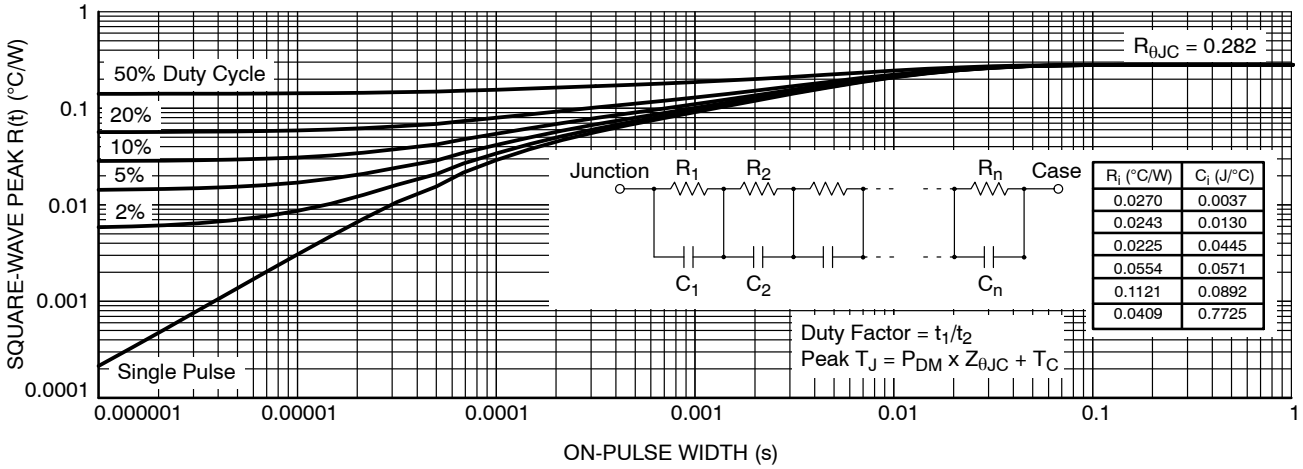


Figure 22. V_F vs. T_J

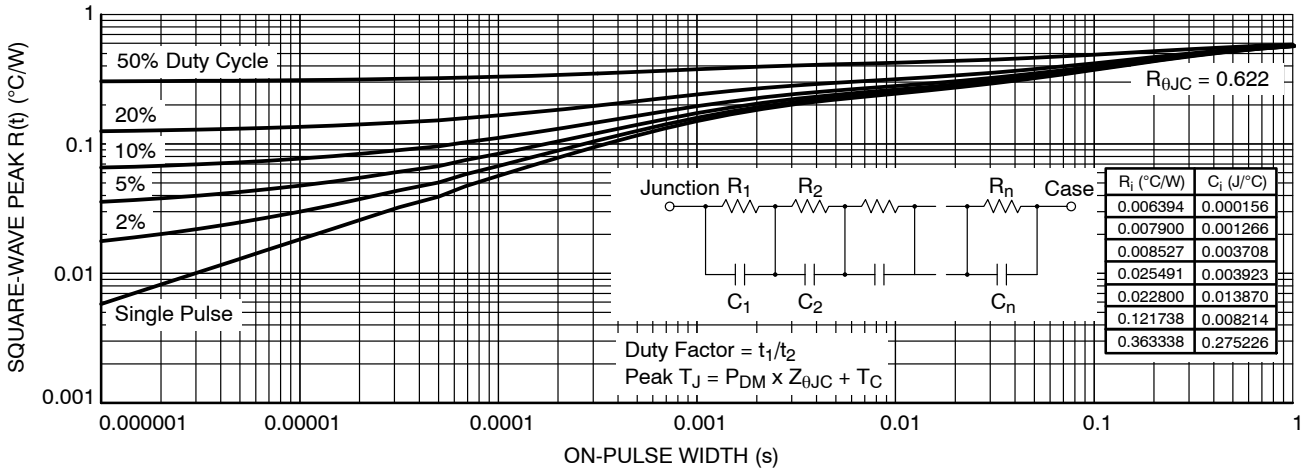
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TYPICAL CHARACTERISTICS (continued)



R_i (°C/W)	C_i (J/°C)
0.0270	0.0037
0.0243	0.0130
0.0225	0.0445
0.0554	0.0571
0.1121	0.0892
0.0409	0.7725

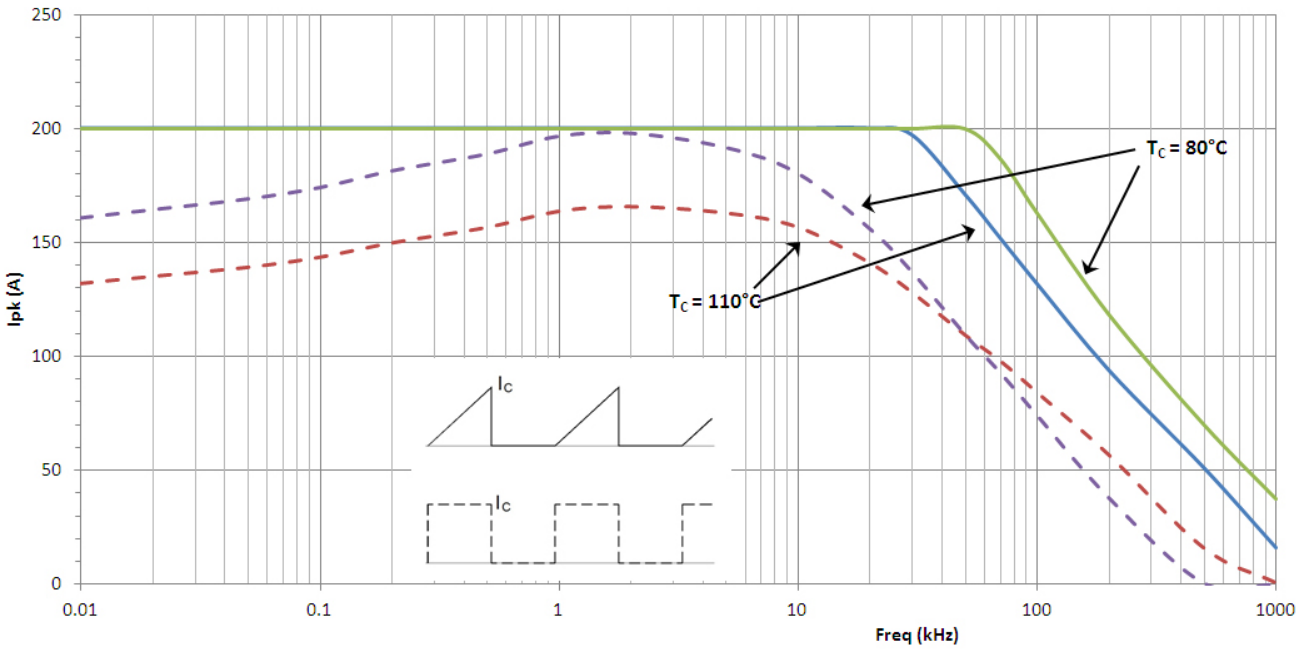
Figure 23. IGBT Transient Thermal Impedance



R_i (°C/W)	C_i (J/°C)
0.006394	0.000156
0.007900	0.001266
0.008527	0.003708
0.025491	0.003923
0.022800	0.013870
0.121738	0.008214
0.363338	0.275226

Figure 24. Diode Transient Thermal Impedance

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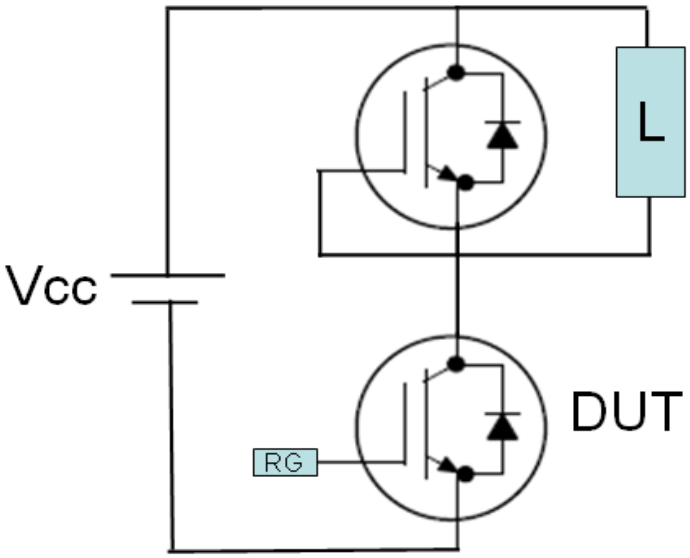


Figure 25. Test Circuit for Switching Characteristics

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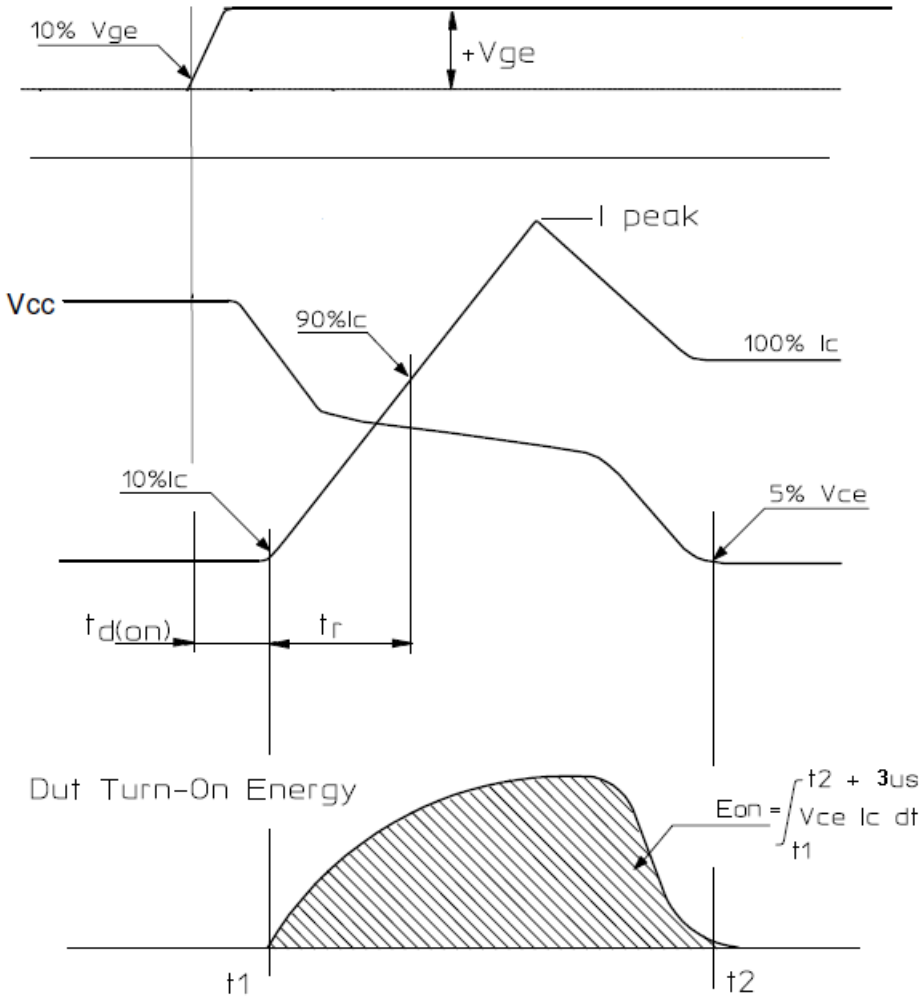


Figure 26. Definition of Turn On Waveform

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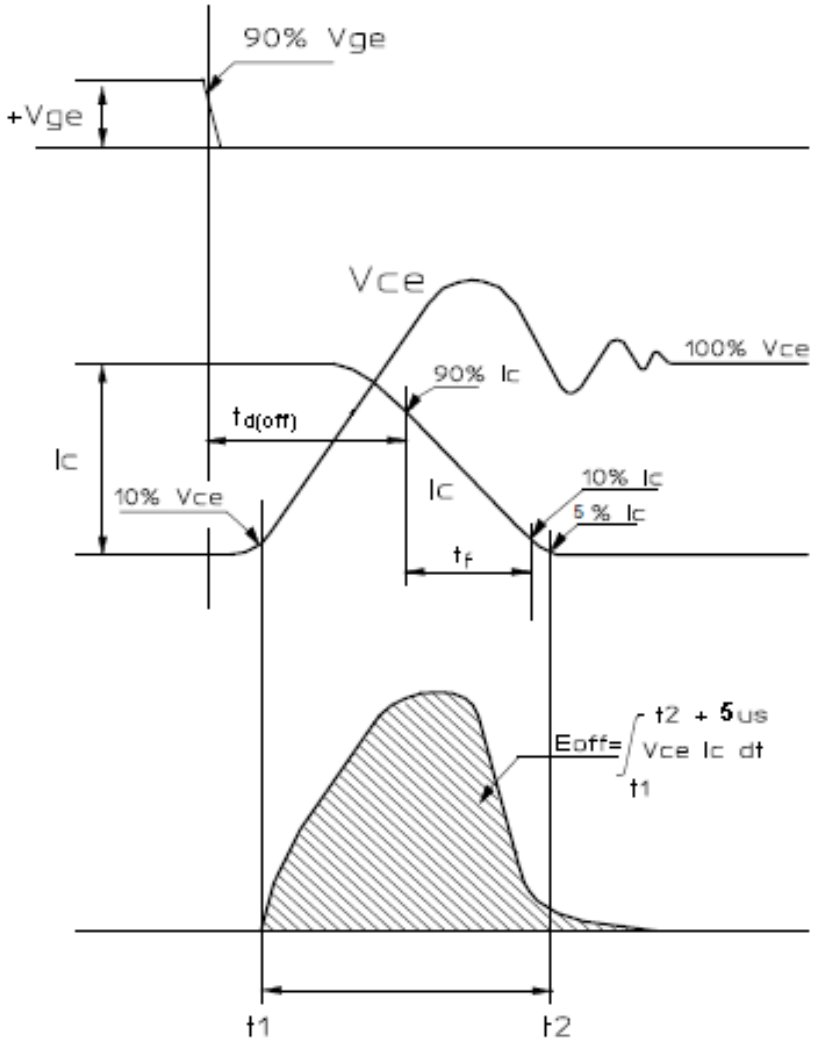


Figure 27. Definition of Turn Off Waveform

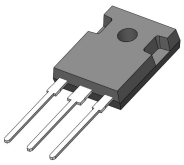
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REVISION HISTORY

Revision	Description of Changes	Date
7	Update the data sheet to move value from Max to Typ under ICES symbol.	3/23/2026

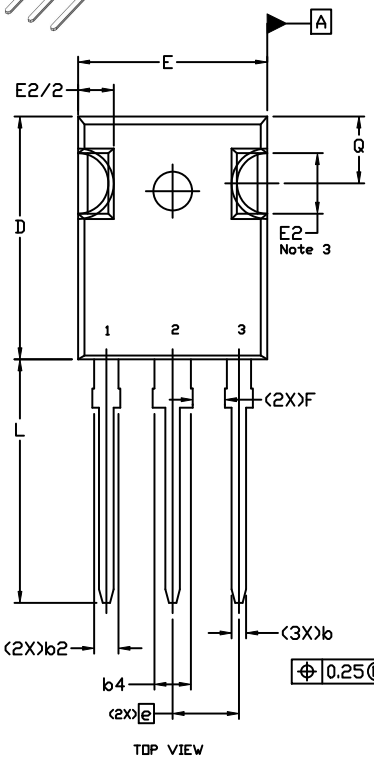
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

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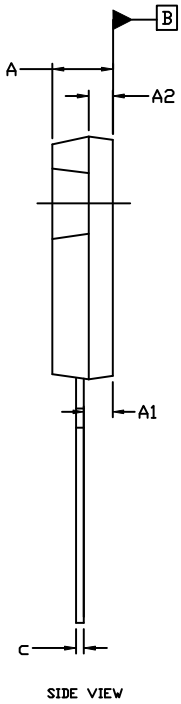


TO−247
CASE 340AM
ISSUE C

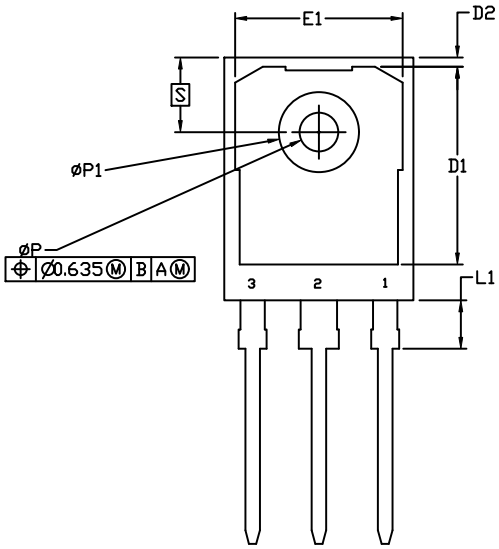
DATE 07 SEP 2021



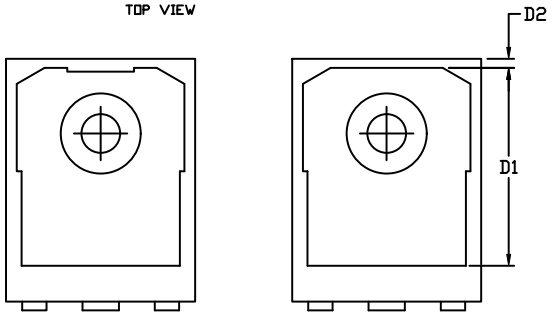
TOP VIEW



SIDE VIEW



BACK VIEW



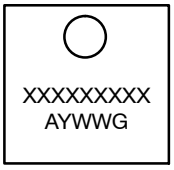
NOTE 4 HEATSINK SHAPES

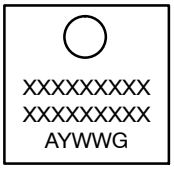
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.70	5.00	5.30
A1	2.20	2.40	2.60
A2	1.80	2.00	2.20
b	1.07	1.20	1.33
b2	1.65	2.12	2.35
b4	2.60	3.12	3.40
c	0.45	0.60	0.75
D	20.80	21.00	21.34
D1	16.30	---	---
D2	0.75	---	---
E	15.50	16.00	16.25
E1	13.80	---	---
E2	4.32	4.90	5.49
e	5.45 BSC		
F	2.655	---	---
L	19.80	20.00	20.80
L1	3.81	4.20	4.35
P	3.55	3.60	3.65
P1	6.60	---	---
Q	5.40	6.00	6.20
S	6.15 BSC		

NOTES:

1. DIMENSIONING AND TOLERANCE AS PER ASME Y14.5M, 2009.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. SLOT REQUIRED, NOTCH MAY BE ROUNDED.
4. OPTIONAL BACK SIDE HEATSINK SHAPE.
5. DIMENSIONS ARE EXCLUSIVE OF BURRS AND MOLD FLASH. DIMENSIONS D AND E ARE MEASURED AT THE OUTERMOST EXTREME OF THE PLASTIC BODY.
6. DIMENSIONS A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
7. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

GENERIC MARKING DIAGRAMS*





XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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